1211477

PATENT SPECIFICATION (11) 1211477

DRAWINGS ATTACHED

(21) Application No. 20747/68 (22) Filed 2 May 1968

(23) Complete Specification filed 7 May, 1969

(45) Complete Specification published 4 Nov. 1970

(51) International Classification F 16 d 63/00

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F2E 2C1B2 2C1G3B 2N2A2A 2N2A2B 2N2B3 2N2B4 2N2C1B 2N2C3B 2N2D2A 2N2D6A 2N2F 2N2K1

(54) IMPROVEMENTS IN BRAKES FOR VEHICLES

ERRATUM

SPECIFICATION NO. 1,211,477

Page 1, Heading, *Above* (54) Title *insert* (72) INVENTOR:- PIOTR OSTROWSKI

THE PATENT OFFICE
3rd January 1971

R 128848/8

at least one disc rotatable within a stationary housing is adapted to be moved axially into frictional engagement with a stationary surface by means of an hydraulically operated annular piston located in an annular recess in an end wall of the housing, and the disc, or one of the discs, if there are more than one, has a cylindrical peripheral surface adapted to be engaged by a contractible band.

The hydraulic operation of the brake by the annular piston is intended to be used for service braking, while the band brake can be used for parking.

Preferably the annular piston acts on the rotatable disc or one of the discs through a non-rotatable axially movable pressure plate incorporating an automatic adjuster whereby the off position of the pressure plate is automatically advanced as wear of the friction surfaces takes place, so that the volume of hydraulic fluid required for the application of the brake is kept substantially constant.

A ring of heat-insulating material may be located between the annular piston and the pressure plate to reduce to a minimum the transfer of heat from the braking surfaces to the piston and so to the hydraulic fluid when the brake is applied.

Two forms of brake in accordance with our invention are illustrated by way of example in the accompanying drawings in which: —

Figure 1 is a section of a brake with a single rotatable disc, the section being taken in a

ly through a stationary housing 13. On one side of the disc there is a non-rotatable pressure plate 14 adapted to be urged against the disc by an annular piston 15 working in an annular recess 16 in an end wall 17 of the housing. When hydraulic fluid under pressure is fed to the recess 16 behind the piston through an inlet 18 the piston forces the pressure plate 14 against the adjacent face of the disc, and the disc is moved axially into engagement with a radial braking surface 19 on the inner face of the opposite end wall 21 of the housing, the disc being frictionally gripped between the pressure plate 14 and the surface 19. A ring 22 of heat-insulating material is located between the pressure plate 14 and the surface 19. A ring 22 of heat-insulating material is located between the piston and the pressure plate to minimise the transference of heat to the hydraulic fluid.

The pressure plate is held against rotation by pins 23 fixed in the housing and engaged in slots in lugs 24 on the periphery of the plate so that the plate can slide axially on the pins.

For the automatic adjustment of the brake to compensate for wear of the friction surfaces adjusting screws 25 are screwed axially through diametrically opposed lugs 26 on the pressure plate, the screws having heads 27 in alignment with abutments 28 on the end wall 17 of the housing and their other ends being adapted to bear on the end wall 21.

SEE ERRATA SLIP ATTACHED

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(54) IMPROVEMENTS IN BRAKES FOR VEHICLES

(71) We, GIRLING LIMITED, a British Company of Kings Road, Tyseley, Birmingham 11, do hereby declare the invention, for which we pray that a Patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement: —

This invention relates to improvements in brakes intended primarily for vehicles such as agricultural tractors and earth-moving machines.

Our invention comprises a brake in which at least one disc rotatable within a stationary housing is adapted to be moved axially into frictional engagement with a stationary surface by means of an hydraulically operated annular piston located in an annular recess in an end wall of the housing, and the disc, or one of the discs, if there are more than one, has a cylindrical peripheral surface adapted to be engaged by a contractible band.

The hydraulic operation of the brake by the annular piston is intended to be used for service braking, while the band brake can be used for parking.

Preferably the annular piston acts on the rotatable disc or one of the discs through a non-rotatable axially movable pressure plate incorporating an automatic adjuster whereby the off position of the pressure plate is automatically advanced as wear of the friction surfaces takes place, so that the volume of hydraulic fluid required for the application of the brake is kept substantially constant.

A ring of heat-insulating material may be located between the annular piston and the pressure plate to reduce to a minimum the transfer of heat from the braking surfaces to the piston and so to the hydraulic fluid when the brake is applied.

Two forms of brake in accordance with our invention are illustrated by way of example in the accompanying drawings in which: —

Figure 1 is a section of a brake with a single rotatable disc, the section being taken in a plane at right angles to the axis of the brake;

Figure 2 is a vertical section on the line 2—2 of Figure 1;

Figure 3 is a section similar to Figure 1 of a modified brake incorporating two rotatable discs; and

Figure 4 is a section on the line 4—4 of Figure 3.

In the brake shown in Figures 1 and 2 a disc 10 having a ring 11 of friction material on each face is slidably keyed by means of splines 12 on a rotatable shaft extending axially through a stationary housing 13. On one side of the disc there is a non-rotatable pressure plate 14 adapted to be urged against the disc by an annular piston 15 working in an annular recess 16 in an end wall 17 of the housing. When hydraulic fluid under pressure is fed to the recess 16 behind the piston through an inlet 18 the piston forces the pressure plate 14 against the adjacent face of the disc, and the disc is moved axially into engagement with a radial braking surface 19 on the inner face of the opposite end wall 21 of the housing, the disc being frictionally gripped between the pressure plate 14 and the surface 19. A ring 22 of heat-insulating material is located between the pressure plate 14 and the surface 19. A ring 22 of heat-insulating material is located between the piston and the pressure plate to minimise the transference of heat to the hydraulic fluid.

The pressure plate is held against rotation by pins 23 fixed in the housing and engaged in slots in lugs 24 on the periphery of the plate so that the plate can slide axially on the pins.

For the automatic adjustment of the brake to compensate for wear of the friction surfaces adjusting screws 25 are screwed axially through diametrically opposed lugs 26 on the pressure plate, the screws having heads 27 in alignment with abutments 28 on the end wall 17 of the housing and their other ends being adapted to bear on the end wall 21.

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The screws have steep pitch multi-start threads and when the brake is applied after wear of the friction surfaces has taken place, the engagement of the screws with the end wall 21 forces the screws through the pressure plate for a distance equal to the wear, and on release of the brake the pressure plate returns to a fresh position defined by the engagement of the heads 27 with the abutments 28, reverse rotation of the screws being prevented by any convenient form of spring clip or ratchet device.

The brake disc is extended radially beyond the braking surfaces and is widened axially to provide a cylindrical peripheral braking surface 29. This surface is encircled by a brake band 31 which is tightened around it by angular movement of a triangular plate 32 to which the ends of the band are connected and which is mounted on a rotatable shaft 33 adapted to be actuated by a hand lever.

In the modified brake shown in Figures 3 and 4 there are two rotatable axially movable discs 34 and 35. A second non-rotatable pressure plate 36 is located between the discs. The disc 34 provides only radial friction surfaces for engagement with the pressure plates, but the disc 35, which is of greater axial thickness than the disc 34 is extended radially and provides a cylindrical peripheral surface 37 for engagement by a brake band 38.

WHAT WE CLAIM IS:—

1. A disc brake in which at least one disc rotatable within a stationary housing is adapted to be moved axially into frictional engagement with a stationary surface by means of an hydraulically operated annular piston working in an annular recess in an end wall of the housing, and the disc, or one of the discs if there are more than one, has a cylindrical peripheral surface adapted to be engaged by a brake band.

2. A disc brake comprising a disc slidably keyed on a rotatable shaft passing through a stationary housing presenting spaced first and second end walls at right-angles to the axis of the shaft, an annular recess in the first end wall of the housing, an hydraulically operated annular piston working in the recess, a non-rotatable pressure plate guided for axial sliding movement in the housing and located between the piston and the disc, fluid pressure applied to the piston moving the pressure plate and disc axially to urge the disc into frictional engagement with the second end wall, a peripheral cylindrical surface on the disc, and a brake band adapted to engage said surface.

3. A disc brake comprising axially spaced first and second discs slidably keyed on a rotatable shaft passing through a stationary housing presenting spaced first and second end walls at right-angles to the axis of the shaft, an annular recess in the first end wall of the housing, an hydraulically operated annular piston working in the recess, a non-rotatable first pressure plate guided for axial movement in the housing and located between the piston and the first disc, a second non-rotatable pressure plate guided for axial movement and located between the discs, fluid pressure applied to the piston urging the assembly of discs and pressure plates towards the second end wall of the housing, a peripheral cylindrical surface on the second disc, and a brake band adapted to engage said surface.

4. A disc brake as claimed in any of the preceding claims in which a ring of heat insulating material is interposed between the annular piston and the pressure plate on which it acts.

5. A disc brake as claimed in any of the preceding claims incorporating means for automatically adjusting the aff position of the pressure plate on which the piston acts to compensate for wear of the friction surfaces.

6. A disc brake substantially as described with reference to Figures 1 and 2 of the accompanying drawings.

7. A disc brake substantially as described with reference to Figures 3 and 4 of the accompanying drawings.

BARKER, BRETTELL & DUNCAN,
Agents for the Applicants,
Chartered Patent Agents,
116, Greenfield Crescent,
Edgbaston, Birmingham 15.

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1211477 COMPLETE SPECIFICATION

4 SHEETS *This drawing is a reproduction of the Original on a reduced scale*

Sheet 1

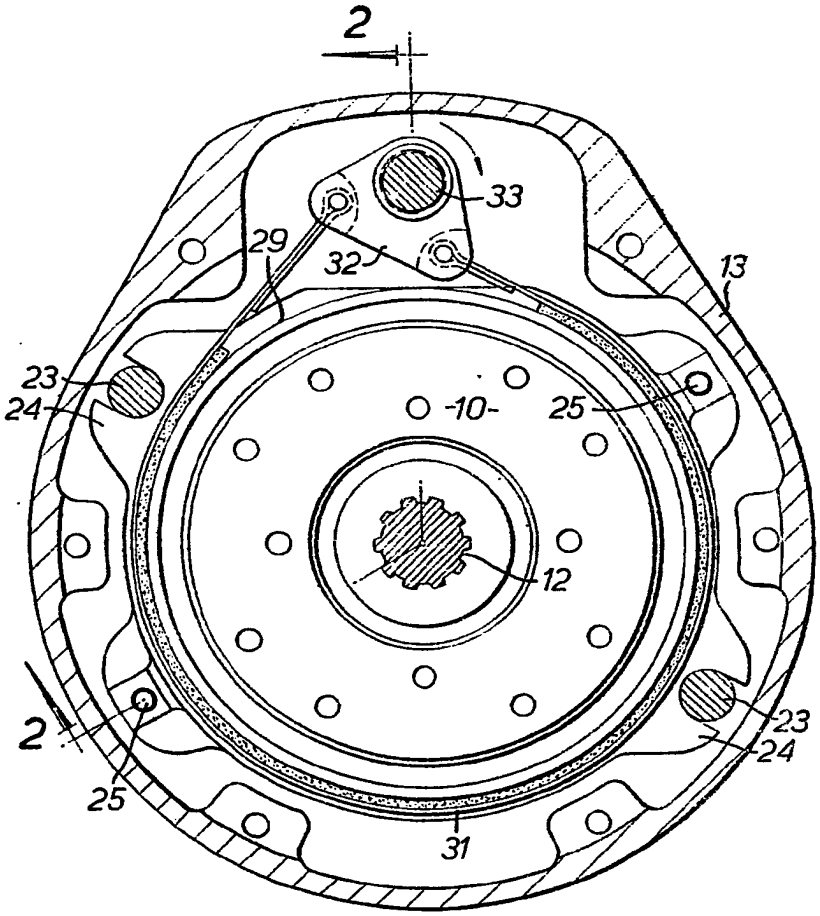

Fig. 1.

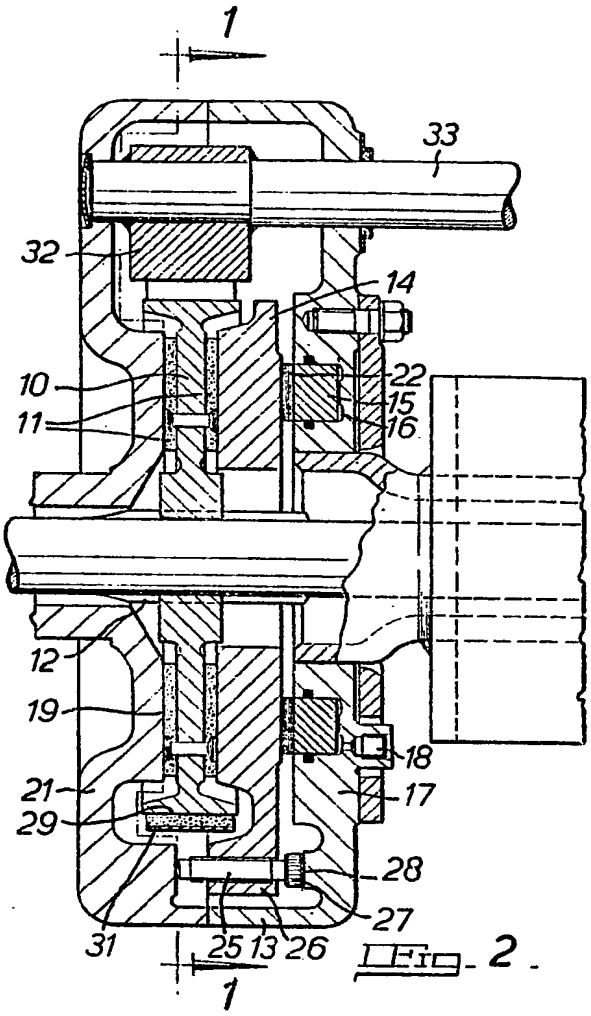

FIG. 2.

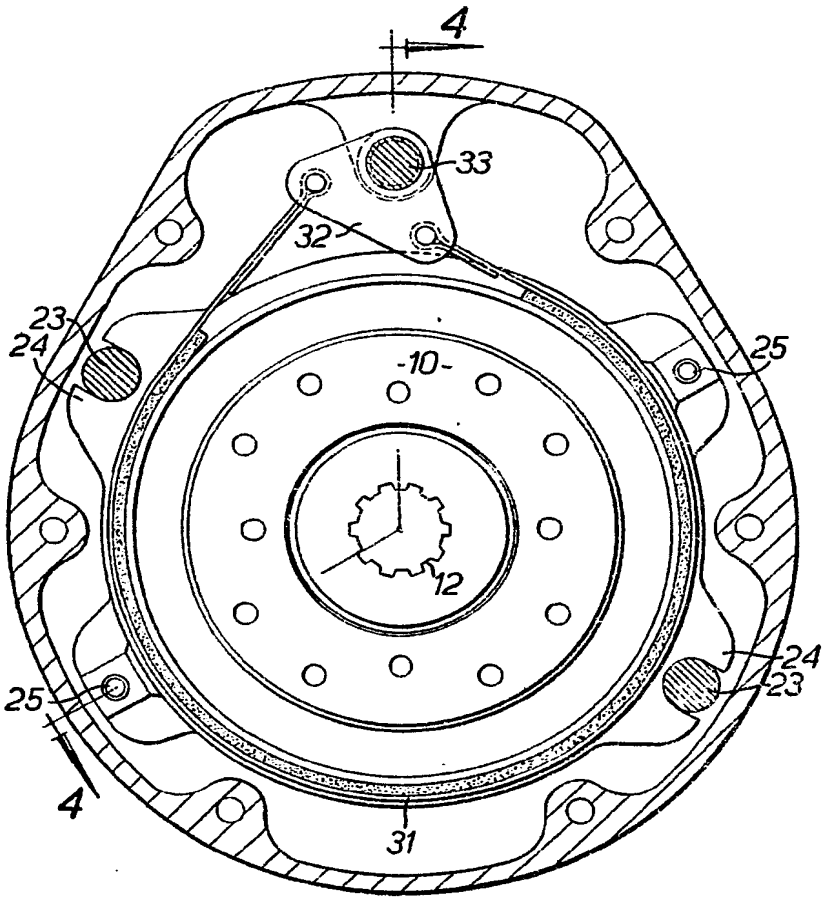

Fig. 3.

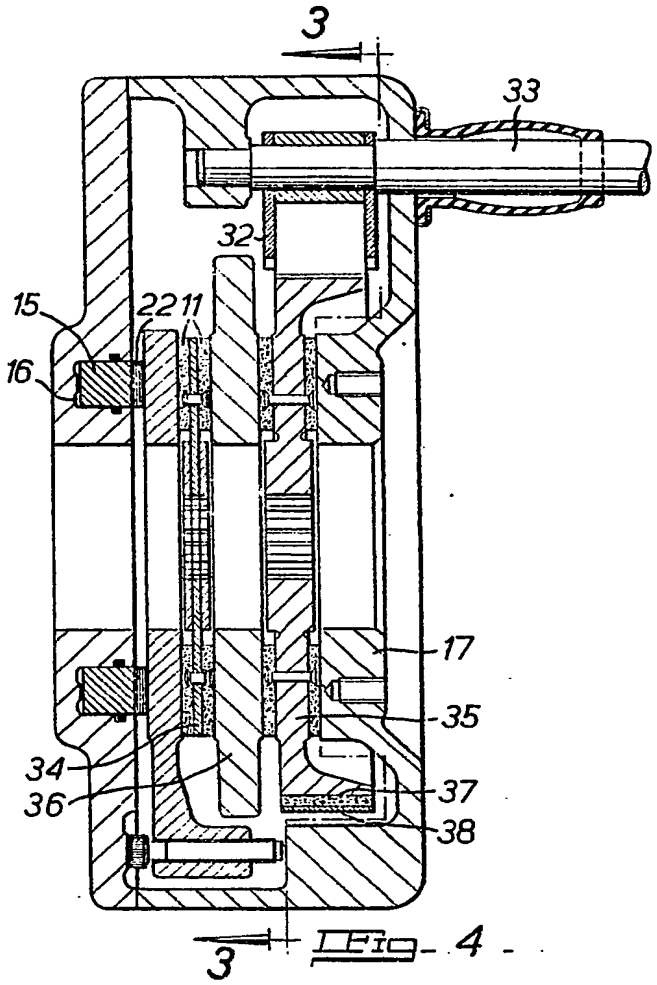

Fig. 4